



Microbial Growth Characteristic Database Design and Implementation

SAN DIEGO STATE UNIVERSITY

David Fu¹, Blaire Robinson², Rob Edwards^{1,2}

¹ San Diego State University, Department of Computer Sciences, ² San Diego State University, Department of Biological Sciences

Abstract

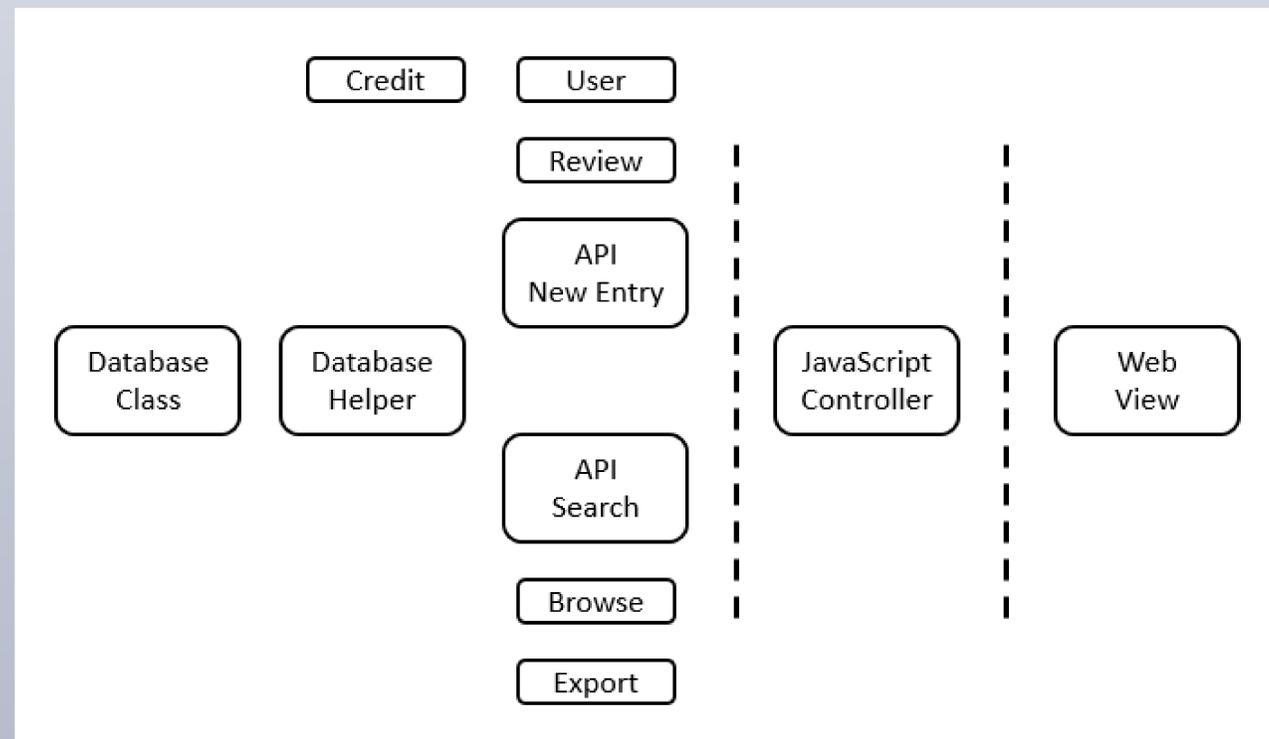
Microbes are crucial to the environment as they fulfill important roles in the carbon and nitrogen cycles, to human health and disease, and in biotechnology through food processing and genetic engineering. Microbes include bacteria, fungi, archaea, protozoa and algae. They live in every part of the biosphere, from hot springs to deep oceans, from the earth's crust to outer space. Their growth conditions also vary dramatically. However, there is currently no tool or database that provides information about microbial growth characteristics and guides on choosing proper growth conditions. Currently all of that data is in books.

The design of Microbial Growth Characteristic Database (MGCD) is based on the premise that different microorganisms will grow differently under the same conditions. The database is made up of a collection of microorganisms and their growth characteristics. Initial data sets will be imported from a literature review, including textbooks, research publications and other readily available sources.

The implementation of the MGCD follows the Model-View-controller (MVC) strategy, the major user interface development architecture. The model is the database, its data and the logic. It can be accessed through an API. The view is the user interface, which contains the user input and the data presenting layer. The controller takes the user input, submits it to the API and gets the results and sends them to user interface. Each of these three modules has its own implementation, and modification of one module won't affect the other modules as long as the interface doesn't change. Currently the main function of each part of the MVC has been implemented. Once more detailed implementation and a better user interface is complete, it will be pushed for testing and placed online.

Web Application of Database

Model-View-Controller Web Application Framework

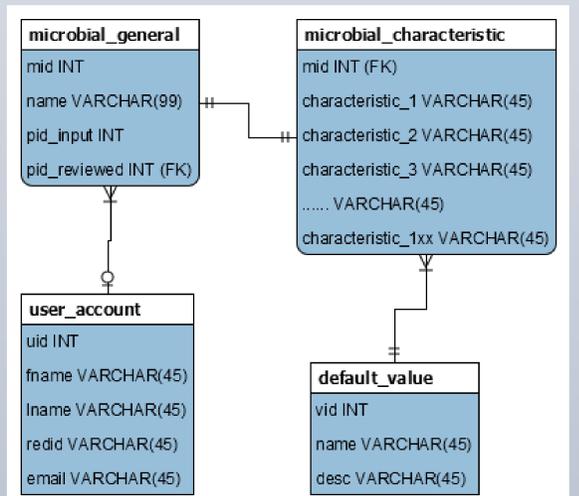
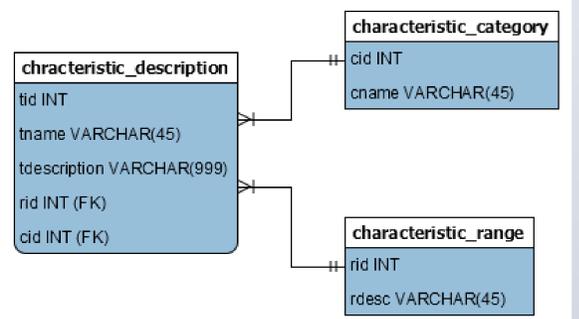


Microbial Characteristic Table

Table 1.8 Differential characteristics of the cultivable species of the genus *Treponema* that ferment carbohydrates*

Characteristic	<i>T. bryantii</i>	<i>T. pectinovorum</i> ^{1,2}	<i>T. phagedenis</i>	<i>T. saccharophilum</i> ³	<i>T. socranski</i> ^{1,2}	<i>T. succinifaciens</i>
Cell diameter (µm):						
0.15-0.20	-	-	-	-	+	-
0.20-0.25	-	-	-	-	-	-
0.30	+	+	+	+	-	-
0.36-0.38	-	-	-	-	-	-
0.6-0.7	-	-	-	+	-	-
Growth requirements:						
Serum	-	-	+	-	-	-
Volatile fatty acids ⁴	+	+	-	+	+	+
Glucose	+	-	-	+	-	+
Fermentation of:						
Glucose	+	-	+	+	d	+
Fructose	-	-	-	+	+	+
Lactose	-	-	-	+	-	+
Maltose	-	-	-	+	-	+
Mannitol	-	-	+	+	-	+
Starch	-	-	-	+	+	+
Sucrose	-	-	-	+	+	+
Ribose	-	-	-	+	+	+
Esculin hydrolysis	-	-	d ⁵	-	-	-
Indole production	-	-	-	-	-	-
1% Glycine (growth)	-	-	-	+	-	-
Phosphatase	-	-	-	+	-	-
Convert fumarate to succinate	-	-	-	+	-	-
β-hemolysis	-	-	-	-	-	Weak

Database Design



Reference

Bergey's Manual of Determinative Bacteriology John G. Holt, LWW, Ninth edition (January 15, 1994)

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